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Algorithms in personnel selection, applicants' attributions about organizations' intents and organizational attractiveness: An experimental study

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Abstract

Machine-learning algorithms used in personnel selection are a promising avenue for several reasons. We shift the focus to applicants' attributions about the reasons why an organization uses algorithms. Combining the human resources attributions model, signaling theory, and existing literature on the perceptions of algorithmic decision-makers, we theorize that using algorithms affects internal attributions of intent and, in turn, organizational attractiveness. In two experiments (N = 259 and N = 342), including a concurrent double randomization design for causal mediation inferences, we test our hypotheses in the applicant screening stage. The results of our studies indicate that control-focused attributions about personnel selection (cost reduction and applicant exploitation) are much stronger when algorithms are used, whereas commitment-focused attributions (quality enhancement and applicant well-being) are much stronger when human experts make selection decisions. We further find that algorithms have a large negative effect on organizational attractiveness that can be partly explained by these

attributions. Implications for practitioners and academics are discussed.

KEYWORDS

algorithms, human resource attributions, personnel selection

Practitioner notes

What is currently known?

- Machine-learning algorithms for personnel selection are promising for several reasons
- Applicant attributions about these reasons have not been studied
- Reactions to algorithms are diverse

What this paper adds?

- Control-focused attributions are stronger when algorithms are used
- Commitment-focused attributions are weaker when algorithms are used
- The use of algorithms diminishes organizational attractiveness
- The negative effect of algorithms on organizational attractiveness is mediated by attributions

Implications for practitioners

- Organizations should be cautious when informing about the use of algorithms
- Practitioners need to proactively communicate reasonable motivations for relying on algorithms

1 | INTRODUCTION

Digitalization has offered new possibilities for organizations to screen and select job candidates (Woods et al., 2020). This includes the use of algorithms to choose whom to invite for a job interview (Cheng & Hackett, 2021). The increasing number of human resources (HR) technology providers offering and large amount of organizations using these decision-making agents (e.g., Unilever, Walmart) attest the prominence and importance of algorithms in practice (Meister, 2017). This trend is explicable given that algorithms have been shown to be more effective and efficient than human experts (Kuncel et al., 2013). However, it is unknown how applicants who are strongly affected by these decisions interpret the use of algorithms.

The literature on algorithms in an HR context provides divergent evidence for employees' reactions, mostly looking at justice or fairness perceptions (for a recent review, see Langer & Landers, 2021). On the one hand and most prominently, academic researchers found that algorithms lead to lower justice perceptions and induce other negative reactions (Newman et al., 2020). On the other hand, this literature also identified positive effects of algorithmic compared to human decision-making (Marcinkowski et al., 2020; Min et al., 2018). In the personnel selection context, experimental research further demonstrated that algorithms violate most of the interpersonal and procedural justice rules, but satisfy the justice rule of consistency (Acikgoz et al., 2020; Noble et al., 2021). The contradictory findings suggest that algorithms arouse diverse reactions that might result from miscellaneous attributes of algorithms and varying interpretations of algorithmic qualities. Exploratory and qualitative research highlights, for example, that higher ratings of trustworthiness and fairness of algorithms were justified mostly by algorithms' objectivity and efficiency; lower ratings of trustworthiness and fairness of algorithms were explained by algorithms' lack of subjective judgment skills and intuition; negative emotions toward the algorithm stemmed mainly from a dehumanizing experience (Lee, 2018). Thus, it is likely that organizations send variant signals to applicants when they communicate to use

algorithms. Surprisingly however, research so far has not revealed the exact signals organizations send with the use of algorithms in personnel selection (Mirowska & Mesnet, 2022).

The aim of our research is to examine which signals about the underlying strategy and employee-related philosophy organizations send to applicants when they communicate to use machine-learning algorithms in the selection process. Looking at such attributions of organizations' intents (Nishii et al., 2008) is essential for the success of organizations, as employees react to HR practices through attributions (Katou et al., 2021). As a relevant reaction in a selection context, we study applicants' perceptions of organizational attractiveness (Chapman et al., 2005). We build our arguments on the growing literature on HR attribution theory (e.g., Hewett et al., 2018; Nishii et al., 2008) and signaling theory (Spence, 1973) and integrate it with the literature on algorithm perceptions. We hypothesize that telling applicants that an algorithm is being used in personnel selection influences applicants' internal attributions of intent and, in turn, organizational attractiveness. Figure 1 displays our theoretical framework. To test our hypotheses, we design two randomized experiments as suggested for mediation models (Stone-Romero & Rosopa, 2008). In Study 1, we manipulate whether either a machine-learning algorithm or a company representative (independent variable) screens an initial online application and measure the effects on internal attributions (mediators) and organizational attractiveness (outcome). In Study 2, we use a concurrent double randomization design by Pirlott and MacKinnon (2016) to addresses upcoming methodological criticism of insufficient attention to causality in HR research (Shin & Konrad, 2017). In this study, we not only manipulate the algorithmic versus human decision-maker, but also use encouragement manipulations of commitment- and control-focused attributions to test for causal effects on organizational attractiveness.

Our work contributes to the literature in several ways. First, we contribute to the HR and broader management literature that has opened the debate about positive and negative features of algorithms (Kellogg et al., 2020; Logg et al., 2019). We provide theoretical arguments and empirical evidence for a context in which algorithms send different signals and finally have negative consequences for organizations using them. Second, we make a contribution to selection research and, more specifically, to the literature on organizational attractiveness and signaling theory. In particular, we respond to a recent call for research on the effects of technology on applicant reactions (McCarthy et al., 2017). We highlight and combine two important theoretical lenses (signaling theory and HR attribution theory) that we expect to be relevant in the context of algorithms and add new aspects to the models that have mostly been limited to traditional selection procedures and human interaction. Regarding signaling theory, we contribute to the important question about which exact signals organizations may unintentionally send and how such signals affect prospective employees and organizations (Connelly et al., 2011). Third, we address several shortcomings of prior research on HR attributions. The HR attributions framework by Nishii et al. (2008) focuses mainly on the content and consequences of HR attributions, but does not sufficiently address antecedents of these attributions (Hewett et al., 2018; Wang et al., 2020). While the scarce research on antecedents of HR attributions looked at whole HR systems (Guest et al., 2021; Van De Voorde & Beijer, 2015), we focus on a specific HR practice and the decision-making agent. Furthermore, this research has also been limited to the effects of attributions on current employees' attitudes and behavior (Fan et al., 2021; Van De Voorde & Beijer, 2015). With this paper, we provide
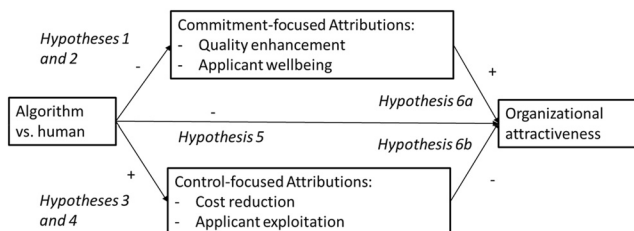

FIGURE 1 Theoretical framework.

initial evidence that attributions about organizations' underlying strategy and employee philosophy are even made by applicants and affect organizational attractiveness.

2 | THEORETICAL BACKGROUND

2.1 | HR attributions of intent

Recently, there has been increased interest in the attributions that employees make about *why* organizations use a particular HR practice (Nishii et al., 2008). According to Nishii et al.'s (2008) typology of HR attributions, they are differentiated by whether the implementation of HR practices is perceived to be due to internal (i.e., strategic considerations and philosophies held by management) or external reasons outside the organization's control. In this manuscript, we focus on internal attributions as they are more relevant in affecting employees (Nishii et al., 2008; Van De Voorde & Beijer, 2015). Nishii et al. (2008) suggested four different internal HR attributions covering percep-tions of organizations' strategic business goals (i.e., quality enhancement vs. cost reduction) and employee-oriented philosophy (i.e., maximizing employee well-being vs. maximizing employee efficiency) underlying the implementation of HR practices. These attributions are further categorized as commitment-focused attributions (i.e., enhance quality and employee well-being) that express the view that organizational success is achieved by enabling employees versus control-focused attributions (cost reduction and employee exploitation) that express the view that organizational success is achieved through clear rules and monitoring.

Most research on HR attributions has focused on the attributions that employees make about bundles of HR practices, respectively, whole HR systems (Fan et al., 2021; Hewett et al., 2018). During the recruiting and selection process, however, applicants only have an isolated view of the organization and its HR practices. At the applicant screening stage, it is likely that applicants' first-hand information about an organization's HR practices is derived from the screening process itself. Consequently, in this manuscript we focus solely on the meaning that applicants attrib-ute to the selection process. We follow the distinction between commitment- and control-focused attributions and also differentiate among the four internal attributions of intent based on whether applicants believe that the organi-zation uses a certain selection process to (1) *enhance quality* (commitment-focused); (2) *enhance applicants' well-being* (commitment-focused); (3) *reduce costs* (control-focused); or (4) *exploit applicants* (control-focused).

The scarce literature on antecedents of HR attributions of intent postulates that characteristics of the HR prac-tice could be one of the stimuli (Hewett et al., 2018). It has also been suggested that individuals make attributions about salient behavior and HR practices depending on the degree to which they are distinctive (Kelley, 1973).

2.2 | Signaling theory

Signaling theory (Spence, 1973) asserts that individuals use all information available to them to infer information they do not have to make decisions. Previous research mostly looked at positive and intentional signals that employers send, but also acknowledged that organizations can send negative and unintentional signals (Connelly et al., 2011). Particularly in early stages of a selection process, applicants interpret the scarce information as signals about the organization and the experience of working at this organization (Turban et al., 2001). These signals then lead to applicants' reactions and affect organizational attractiveness (Celani & Singh, 2011). The recruitment and selection literature provides ample evidence for the effects of selection process features, including recruiter characteristics, on organizational attractiveness (Hausknecht et al., 2004).

3 | HYPOTHESES DEVELOPMENT

3.1 | Algorithms and selection-specific attributions

We argue that an organization's use of algorithms provides a salient and distinctive signal intentionally or unintentionally embedded in the selection process that affects applicants' attributions about the organization's intent of using such a selection process. Prior research identified positive and negative attributes of and different reactions to algorithms. In the following, we concentrate on the attributes that we believe are most relevant for the four internal attributions of intent and in the specific personnel selection context.

3.1.1 | Commitment-focused attributions

Among the commitment-focused attributions, the *quality enhancement attribution* encompasses the extent to which people believe that the implementation of HR practices is driven by the organization's strategic business goal to enhance the quality of its services and products (Nishii et al., 2008). In personnel selection, this attribution is best expressed by the perception that an organization tries to select high-performing employees who help the organization enhance quality, thereby generating profits (Schuler & Jackson, 2011).

Even if algorithms can outperform humans in HR decision-making, most people think that humans, but not algorithms, have the ability to identify top candidates (Lee, 2018). This is partly because employees fear that algorithms reduce accurate information via quantification while neglecting qualitative characteristics (Newman et al., 2020). We believe that the consideration of qualitative characteristics is an essential characteristic in the curriculum vitae (CV) screening context. For example, applicants might assume that an algorithm focuses only on certain keywords and sums up quantitative characteristics (e.g., years of work experiences) whereas a human decision-maker can also detect unique qualities. In exploratory analyses, Dietvorst et al. (2015) asked participants to compare algorithms and humans on specific attributes. These analyses showed that people perceive algorithms to be significantly better than humans in avoiding obvious mistakes and appropriately weighing qualities, but to be worse in detecting exceptions and finding underappreciated candidates when predicting students' performance based on admissions data. We argue that the characteristics avoiding obvious mistakes and appropriately weighing qualities are rather important to ensure a minimum standard of performance, whereas the characteristics detecting exceptions and finding underappreciated candidates that are attributed more to humans than algorithms are most relevant for high levels of quality and the selection of high-performers. Hence, we expect applicants to interpret the use of hiring algorithms, compared to the use of human experts, to be less of a signal of an underlying quality-enhancement strategy. Furthermore, in a recent qualitative study, some of the 33 interviewees mentioned that using AI could indicate that the organization is not interested in exceptional applicants or has problems with HR (Mirowska & Mesnet, 2022). In our specific context, we argue that applicants infer that the organization uses algorithms to screen CVs because of a high turnover of employees or because their human decision-makers might lack decision-making skills. Based on this, we hypothesize:

Hypothesis 1. Algorithm-based compared to human-based decision-making in personnel selection lowers applicants' selection-specific quality enhancement attribution.

The *applicant well-being attribution* suggests that the implementation of HR practices is motivated by an organization's philosophy of caring for employee well-being (Nishii et al., 2008). In personnel selection, this attribution is expressed by the perception that an organization shows appreciation for applicants and cares for their well-being.

Initial research on the attributed features of algorithms indicated that people believe that humans, but not algorithms, treat them as individuals (Dietvorst et al., 2015). Moreover, when managers spend their time reviewing applicants' profiles, people interpret this as recognition (Lee, 2018). Algorithms, in contrast, violate most justice

perceptions of applicants (Noble et al., 2021), such as reconsideration opportunity and treatment that are highly relevant for applicants' feelings of being appreciated. Algorithms that review CVs also evoke significantly more negative emotions compared to managers who review CVs (Lee, 2018). In sum, we believe that applicants might be less likely to view the use of algorithms, rather than human decision-makers, as a signal of an organization's appreciation and caring for their well-being. Thus, we hypothesize:

Hypothesis 2. Algorithm-based compared to human-based decision-making in personnel selection lowers applicants' selection-specific well-being attribution.

3.1.2 | Control-focused attributions

The *cost reduction attribution* reflects employees believing that the design or implementation of an HR practice is motivated by the organization's strategic focus on low costs (Nishii et al., 2008). Organizations that follow this strategy are often expected to view their (prospective) employees as replaceable and as a cost factor that needs to be controlled (Schuler & Jackson, 2011).

Algorithms provide organizations with several mechanisms to control employees (Kellogg et al., 2020). Indeed, algorithmic evaluations are experienced as a form of control by freelancers (Rahman, 2021). We expect that this control is also perceived by applicants whose CVs are rated and evaluated by algorithms. Furthermore, the accompanying and perceived efficiency of screening algorithms (Lee, 2018; Mirowska & Mesnet, 2022) might be interpreted as an organization's intention to save hiring costs. In sum, applicants might interpret the use of hiring algorithms as a signal of an underlying cost-saving strategy in which the organization views the employee selection process as a cost factor that should be minimized. We hypothesize:

Hypothesis 3. Algorithm-based compared to human-based decision-making in personnel selection enhances applicants' selection-specific cost reduction attribution.

The *employee exploitation attribution* describes the perception that the implementation of HR practices is motivated by a management philosophy that focuses on exploiting and getting the most out of employees (Nishii et al., 2008). In selection, this philosophy is expressed by the impression that an organization may not always have the interests of its applicants at heart.

The use of algorithms particularly in a CV screening context lowers applicants' interpersonal justice perceptions, violates most of the procedural justice rules such as chance to perform and reconsideration opportunity (Noble et al., 2021), and negatively affects applicants' overall fairness perceptions and trust (Lee, 2018). As such, applicants may think that organizations that communicate to use algorithms in CV screening are not interested in presenting a fair and trustworthy application process. Furthermore, algorithms that judge human behavior or job suitability can be perceived as creepy (Langer & König, 2018), dehumanizing, and demeaning and induce negative emotions (Lee, 2018). Applicants may infer that the organization does not value human interaction and might even view such as selection process as a warning about the organization's culture (Mirowska & Mesnet, 2022). Consequently, we argue that applicants interpret the use of algorithms in the screening process, compared to the use of human decision-makers, as a signal of an underlying employee philosophy of exploiting and getting the most out of the organization's prospective employees. We hypothesize:

Hypothesis 4. Algorithm-based compared to human-based decision-making in personnel selection enhances applicants' selection-specific exploitation attribution.

3.2 | Algorithms and organizational attractiveness

We next argue that the use of hiring algorithms lowers organizational attractiveness. Previous research based on signaling theory showed that characteristics of the selection process and recruiters provide strong signals for applicants and starkly affect applicant attraction. Meta-analytic findings demonstrate that recruiter behaviors influence organizational attractiveness, with trustworthiness, personableness, and competence being among the strongest influencing factors (Chapman et al., 2005). We expect that the use of algorithms in the screening process sends a noticeable signal to prospective employees and removes most of these positive recruiter characteristics, and, thus, negatively affects organizational attractiveness. Applicants may consequently also expect a lack of human decision-making and interactions in the organization as a whole.

In addition, the organizational justice model suggests that selection procedures and HR personnel affect applicants' reactions through procedural justice perceptions (Gilliland, 1993). When applicants perceive the selection process as unfair, the organization becomes less attractive because they expect unfair treatment within the organization. Based on this theoretical model, prior work provides initial evidence that algorithms used in digital job interviews lower organizational attractiveness through applicants' justice perceptions (Acikgoz et al., 2020; Köchling & Wehner, 2022).

In line with our main theoretical framework and focus of the study, we primarily expect that the negative effect of algorithms on organizational attractiveness is partially mediated by applicants' lower commitment- and higher control-focused attributions. As outlined in our argumentation thus far, we expect that applicants believe that organizations use algorithms to reduce costs and exploit prospective employees, thereby signaling a control-focused strategy and employee philosophy. At the same time, algorithmic decision-makers lead to lower commitment-focused attributions comprising signals about the organization's quality-enhancing strategy and employee philosophy that targets employee well-being. These are important signals about the organization as a future employer. Taken together, we hypothesize:

Hypothesis 5. Organizational attractiveness is lower for algorithm-based than human-based decision-making in personnel selection.

Hypothesis 6. The negative effect of algorithm-based compared to human-based decision-making in personnel selection on organizational attractiveness is mediated by (a) lower commitment-focused attributions and (b) higher control-focused attributions.

4 | OVERVIEW OF STUDIES

To test our hypotheses, we designed two experiments as suggested for testing causality in mediation models (Pirlott & MacKinnon, 2016; Stone-Romero & Rosopa, 2008). In Study 1, we manipulated the decision-maker (algorithm vs. human) and measured the four selection-specific HR attributions and organizational attractiveness. However, this study design doesn't allow to explicitly disentangle cause and effect between mediators and outcomes (Hypotheses 6a and b) because participants are randomly assigned to different levels of the independent variable only, but not to different levels of the mediator. Since the mediators and outcome variables are correlational as they are measured simultaneously, we cannot rule out reverse causality (i.e., perceptions of organizational attractiveness affect attributions) or third variable effects (e.g., a positive overall impression of the selection process affects both attributions and organizational attractiveness; Spencer et al., 2005). Thus, to test for causal effects of control-focused and commitment-focused attributions on organizational attractiveness, we used a concurrent double randomization design in Study 2 following the suggestions of Pirlott and MacKinnon (2016). In a 3 × 2 experimental design, we encouraged a mediator manipulation (commitment- vs. control-focused attributions vs. neutral condition) and again

manipulated the independent variable (algorithm vs. human). We measured organizational attractiveness and the four internal attributions of intent. This also provides us with further support for all our hypotheses.

5 | STUDY 1

5.1 | Method

5.1.1 | Sample

We conducted an online experiment on Amazon Mechanical Turk. All participants were compensated with $1.50 for 12 min of their expected working time. Participants needed to fulfill the following requirements: (a) be US citizens, to increase the likelihood of participants' proficiency in English as suggested (Feitosa et al., 2015); (b) be employed (not self-employed), because we wanted our participants to identify with their role as applicant; and (c) have completed at least 100 Human Intelligence Tasks with a 98% approval rate or better, to ensure data quality (Keith et al., 2017). We had to exclude one participant who indicated to be not a US citizen and eight participants who indicated to be self-employed. In our experiment, we also included seven attention checks to detect careless responders and, thus, further enhance data quality (Oppenheimer et al., 2009). We screened out 32 participants who did not pass all our attention checks. This left 259 participants in the final sample. Participants had applied for an average of 12.5 jobs during the last 5 years.

5.1.2 | Procedure

We told participants that we were evaluating the employee selection process of a German company that wanted to expand globally. Therefore, we presented screenshots showing the options available to applicants when starting the application on the company's website (i.e., using information from a social media account, uploading a CV, or filling out the profile manually). We subsequently told participants that, after completing the online application, applicants received an email from the organization informing them about the next steps. We used this part of the experiment for our manipulation of the decision-maker.

Afterwards, we asked participants to evaluate the company's screening process. We used these questions to assess our dependent variables. Next, we presented a manipulation check and asked questions about participants' individual characteristics. Finally, we debriefed all participants.

5.1.3 | Manipulation of the decision-maker

Participants were randomly assigned to one of the two hiring-decision conditions. They received a screenshot of an email with the information that their application would be screened by either a machine-learning *algorithm* or a *company representative*.

5.1.4 | Measures

For all survey items, we used a 5-point Likert-scale with response options varying for the specific questions (e.g., "I strongly agree" or "To a large extent").

HR Attributions. Nishii's et al. ([2008](#)) original scale for HR attributions was designed to measure HR attributions for bundles of HR practices including employee selection. Accordingly, the scale includes only one item per attribution and HR practice. As we are interested in participants' HR attributions regarding a single HR practice (i.e., an applicant screening process), using the original scale would pose a threat to the reliability of the measurement for our dependent variables. Consequently, scholars have recommended that the scale be adapted for specific HR practices (Hewett et al., [2018](#)). Following this call, and building on Hewett et al.'s ([2019](#)) work, which adapted the original scale to measure HR attributions for a single HR practice, we formulated three items for each attribution that specifically fit the context of employee selection. Our formulations were as close as possible to the original items and descriptions of Nishii et al. ([2008](#)). The scales yielded satisfactory to high internal consistencies: *quality enhancement* (Cronbach's alpha = .92), *applicant well-being* (Cronbach's alpha = .91), *cost reduction* (Cronbach's alpha = .87), and *applicant exploitation* attribution (Cronbach's alpha = .76.). All items are listed in Supporting Information S1: Appendix A.

General Organizational Attractiveness. To measure general *organizational attractiveness*, we used the five-item scale of Highhouse et al. ([2003](#)). A sample item is "This company is attractive to me as a place for employment." Cronbach's alpha was .94.

Manipulation Check. To check that our manipulation worked, we asked all participants to indicate "To which extent did the following entities play a role in the decision-making process?"—"an algorithm" (*manipulation check 1*) and "a company representative" (*manipulation check 2*).

5.2 | Results

We used independent Welch *t*-tests to check whether our manipulation was effective. For *manipulation check 1*, ratings were significantly higher under the algorithm condition ($M = 4.87$, $SD = 0.41$) than under the human condition ($M = 1.62$, $SD = 1.10$, $t(156.70) = -30.91$, $d = -3.95$, $p < .001$). For *manipulation check 2*, ratings were significantly higher under the human condition ($M = 4.50$, $SD = 0.88$) than under the algorithm condition ($M = 1.57$, $SD = 0.92$, $t(258.90) = 26.23$, $d = -3.26$, $p < .001$). These results indicate that our manipulation was effective.

Table 1 displays the means, standard deviations, and zero-order correlations for all main variables. We tested the main effects of algorithms on applicants' HR attributions using independent Welch *t*-tests. The results are displayed in Figure 2. As expected in Hypotheses 1 and 2, commitment-focused attributions were significantly lower when the algorithm, compared to the company representative, supposedly screened the application documents (*quality enhancement*: $t(247.40) = 6.49$, $d = 0.80$ $p < .001$; *applicants' well-being*: $t(245.21) = 6.54$, $d = 0.82$, $p < .001$). In support of Hypotheses 3 and 4, control-focused were significantly higher for algorithm-based than human-based decision-making (*cost reduction*: $t(224.93) = -6.53$, $d = -0.82$, $p < .001$; *applicant exploitation*: $t(256.12) = -7.30$, $d = -0.91$, $p < .001$). Our results also support Hypothesis 5 because *organizational attractiveness* was significantly lower when the algorithm instead of the company representative supposedly screened the documents ($t(243.03) = 7.83$, $d = 0.96$, $p < .001$). Finally, we tested whether commitment-focused (Hypothesis 6a) and control-focused attributions (Hypothesis 6b) mediate the relationship between the decision-making agent and organizational attractiveness. Therefore, we used the average of the *quality enhancement* and the *applicant wellbeing* attributions to measure *commitment-focused attributions* and the average of the *cost reduction* and the *applicant exploitation* attributions to measure *control-focused attributions* as categorized by Nishii et al. ([2008](#)). We computed bootstrap confidence intervals with 1000 resamplings and assessed the effects of the individual mediators in separate analyses. Results from these analyses are reported in Table 2. The results demonstrate the indirect effect of the algorithm (vs. company representative) on organizational attractiveness through *commitment-oriented attributions* and *control-focused attributions* in support of Hypotheses 6a and 6b.

TABLE 1 Means, standard deviations, and correlations for variables in study 1.

Variable	M/SD	1	2	3	4	5	6	7	8	9	10
1. Age	40.31/10.95										
2. Female	0.49/0.50	−0.02									
3. Education	3.61/1.11	−0.02	0.02								
4. Algorithm (1) versus human (0)	0.52/0.50	0.01	−0.02	0.04							
5. MC algorithm	3.31/1.82	0.01	−0.01	0.01	0.89***						
6. MC human	2.99/1.72	−0.04	−0.01	−0.06	−0.85***	−0.91***					
7. Quality enhancement	3.62/1.01	0.04	0.08	−0.02	−0.37***	−0.39***	0.40***				
8. Applicant well-being	2.40/1.03	−0.11	0.05	−0.01	−0.38***	−0.38***	0.40***	0.50***			
9. Cost reduction	3.84/0.88	0.00	−0.06	0.04	0.38***	0.46***	−0.41***	−0.30***	−0.26***		
10. Applicant exploitation	2.62/0.92	−0.12*	−0.12*	0.06	0.41***	0.46***	−0.43***	−0.45***	−0.37***	0.44***	
11. Organizational attractiveness	3.28/0.98	0.06	−0.01	0.01	−0.43***	0.42***	0.48***	0.59***	0.41***	−0.26***	−0.48***

Note: N = 259.

Abbreviation: MC, manipulation check.
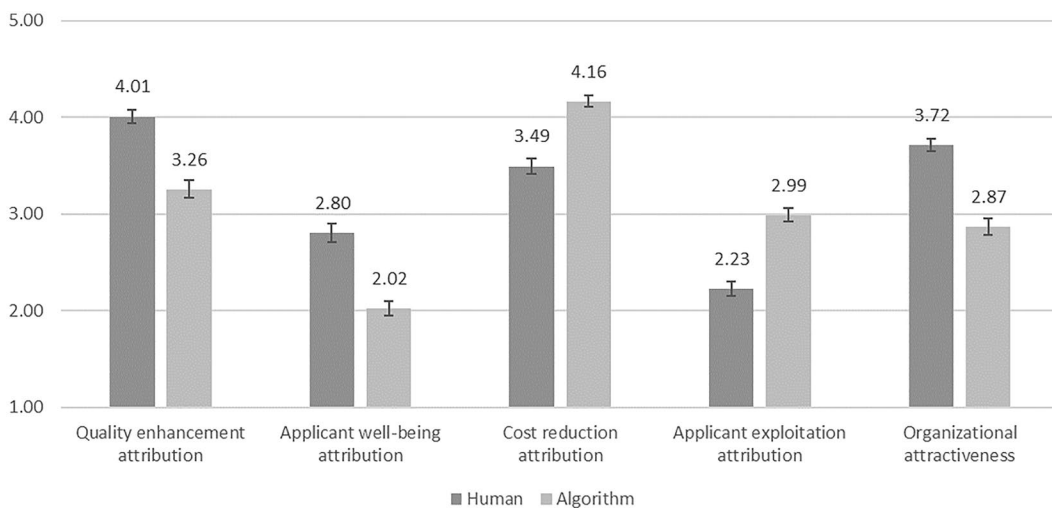
$*p < .05, **p < .01, ***p < .001.$

FIGURE 2 Means across conditions in Study 1. *N* = 259; error bars indicate standard errors. [Corrections made on 28 November 2023, after first online publication: Figure 2 has been corrected in this version.]

TABLE 2 Results of bootstrapping tests for mediation analyses in study 1.

Predictor	Mediator	Outcome	Total effect b (c path)	Direct effect b (c' path)	Indirect effect ab	SE	95% CI [LL; UL]	Ratio of indirect to total effect
Algorithm (1) versus human (0)	Commitment-focused attributions	Organizational attractiveness	−0.85***	−0.45***	−0.40	0.08	[−0.56; −0.24]	47%
	Control-focused attributions			−0.58***	−0.27	0.06	[−0.39; −0.16]	32%

Note: N = 259. ab, SE, and 95% CI based on 1000 bootstrap samples.

Abbreviations: CI, confidence interval; LL, lower limit; SE, bootstrapped standard error; UL, upper limit.

*p < .05; **p < .01; ***p < .001.

6 | STUDY 2

6.1 | Method

6.1.1 | Sample

For our second online experiment, we recruited an international sample via Prolific, a platform which provides researchers with access to a diverse population and with high-quality data (Peer et al., 2017). Participants were compensated with £2.00 for approximately 20 min of their time. The experiment included two attention checks similar to those in Study 1. We screened out 70 individuals who did not pass one or both of these attention checks. As it was essential that participants carefully read all parts of our descriptions and manipulations, we also excluded 103 participants from the final sample who failed our manipulation checks (further information on these manipulation checks are given below). The final sample used to test our hypotheses consisted of 342 participants. Participants had applied for an average of 5.68 jobs during the past year and 44.74% of participants are currently searching for a job.

6.1.2 | Procedure

Participants had to go through a selection process as if they were applying for a real job. We informed participants that we were a research institute and were conducting a study for one of our clients, an established corporation located in Germany. We told participants that we were interested in their feedback to elaborate whether the current selection process needed to be modified for other countries. This time, we manipulated both, the mediators (attributions) and the independent variable (decision-maker) to establish the correct causal order between the mediators and outcome (organizational attractiveness) as suggested for experimental mediation models. We used a 3 × 2 concurrent double randomization design: we gave participants background information about the company (including the encouragement manipulation of commitment- vs. control-focused attributions vs. neutral setting) and the selection process (including the manipulation of algorithmic vs. human decision-maker). Next, participants were directed to the company client's jobsite to upload their anonymized CV. Only after successfully uploading a document did participants receive a code that permitted them to continue with the study and answer questions about the selection process and the company as an employer. Finally, we collected demographics, debriefed participants, and revealed our real identity.

6.1.3 | Manipulation of control-focused and commitment-focused attributions

As attributions of intent are formed by individuals, they cannot be manipulated directly, but they can be encouraged by providing participants with information about an organization's intention (i.e., strategic goals and employee philosophy) that motivates the use of a particular practice (for encouragement manipulation, see Imai et al., 2013; Pirlott & MacKinnon, 2016). We randomly assigned participants to different conditions in which we manipulated either a *commitment-focused* or *control-focused* strategic goal and employee philosophy that underlies the selection process or to a *neutral* condition in which we did not provide any information about the company's strategy or philosophy. The descriptions of these manipulations were as close as possible to the definitions and items formulated by Nishii et al. (2008). Supporting Information S1: Appendix B presents the exact wording.

6.1.4 | Manipulation of the decision-maker

Similar to Study 1, we randomly assigned participants to different conditions in which we stated that their CV would be screened by either a machine-learning algorithm or a company representative that decides whether applicants will be invited to a final interview or not. We included this manipulation graphically in the first presentation of the selection process before the CV upload and in a confirmation email after the CV upload. In this email, we wrote, "A machine-learning algorithm [company representative] will now screen your CV and decide if you are among the final candidates who will be considered for the position and be invited to a final interview."

6.1.5 | Measures

Organizational Attractiveness. We used the same scale that we used in Study 1. Cronbach's alpha was .91, indicating a sufficiently high internal consistency.

　　Manipulation Checks and Additional Measures. We used the same items that we used in Study 1 for *manipulation check 1* and *2* and to measure *attributions*. We also gave participants the opportunity to give additional open feedback. The comments indicated that participants believed our cover story and that the selection process was convincing as an actual selection process of an organization.

6.2 | Results

Table 3 displays the means, standard deviations, and zero-order correlations for all main variables. Following recommendations regarding concurrent double randomized designs (Pirlott & MacKinnon, 2016), we first tested the effects of our algorithmic manipulation and encouragement attribution manipulation on organizational attractiveness with analysis of variance (ANOVA) and planned contrast effects. The ANOVA revealed significant differences in *organizational attractiveness* across groups ($F_{(5, 336)} = 6.74$, $p < .001$, $\eta^2 = .09$). Table 4 displays the means of organizational attractiveness across conditions. Results of planned contrasts showed that *organizational attractiveness* was significantly lower in the algorithm condition than in the company representative condition ($F_{(1, 336)} = 4.04$, $d = 0.20$, $p = .045$), as hypothesized in Hypothesis 5. Comparisons between groups in which we encouraged commitment- or control-focused manipulations versus the neutral group without this manipulation showed that the control-focused manipulation significantly lowered *organizational attractiveness* ($F_{(1, 336)} = 13.72$, $d = 0.42$, $p < .001$) whereas the commitment-focused manipulation only slightly enhanced *organizational attractiveness* ($F_{(1, 336)} = 2.76$, $d = -0.25$, $p = .098$). This supports that control-focused (and to a small extent commitment-focused) attributions causally affect organizational attractiveness.

Our design also allowed us to look at the influence of algorithms on the measured attributions. ANOVA results showed that ratings for all four individual attributions differed significantly across groups (*quality enhancement*: $F_{(5, 336)} = 11.43$, $p < .000$, $\eta^2 = .15$; *applicant well-being*: $F_{(5, 336)} = 10.39$, $p < .001$, $\eta^2 = .13$; *cost reduction*: $F_{(5, 336)} = 11.19$, $p < .001$, $\eta^2 = .14$: *applicant exploitation*: $F_{(5, 336)} = 9.04$, $p < .001$, $\eta^2 = .12$). Figure 3 compares the means of the measured attributions between the selection process with the algorithmic and the human decision-maker. As hypothesized in Hypotheses 1–4, the process with the algorithm received lower values for the *quality enhancement* ($F_{(1, 336)} = 9.96$, $d = 0.34$, $p = .002$) and the *applicant well-being attributions* ($F_{(1, 336)} = 18.76$, $d = 0.47$, $p < .001$) and higher values for the *cost reduction* ($F_{(1, 336)} = 8.44$, $d = -0.27$, $p = .004$) and *applicant exploitation attributions* ($F_{(1, 336)} = 7.79$, $d = -0.26$, $p = .006$).

7 | DISCUSSION

The results from our experimental studies show that control-focused attributions such as a cost-saving strategy and an employee exploitation philosophy are stronger when algorithms are used in the CV screening process whereas commitment-focused attributions such as a quality enhancement strategy and employee well-being philosophy are stronger when human experts make selection decisions. Thus, by relying on algorithms, organizations signal to applicants that employees are considered more as a replaceable cost factor than as a valuable asset that the organization cares for and supports. Our findings further demonstrate that algorithms used in the applicant screening process have negative effects on organizational attractiveness. Results from Study 2 show that control-focused attributions lead to lower organizational attractiveness. However, commitment-focused attributions seem to lead to only a slight increase in organizational attractiveness. It is reasonable that negatively associated attributions have stronger effects than positively associated attributions since negative events oftentimes lead to stronger reactions (Lange & Washburn, 2012). Remarkably, effect sizes are much smaller in Study 2 than Study 1. This could result from the mixed signals that we manipulated in Study 2. For example, some participants were informed that the organization follows a commitment-focused strategy and philosophy, but uses an algorithm that sends a signal rather about a control-focused than about a commitment-focused orientation. Comparing the means of organizational attractiveness of the groups that received uniform signals in Study 2, that is, algorithm and control-focused manipulation ($M = 2.93$, $SD = 1.04$) versus company representative and commitment-focused manipulation ($M = 3.75$, $SD = 0.62$), we find similar effect sizes in both studies ($F_{(1, 336)} = 25.95$, $d = 0.96$, $p < .001$).

TABLE 3 Means, standard deviations, and correlations for variables in study 2.

Variable	M/SD	1	2	3	4	5	6	7	8	9	10
1. Age	26.86/8.67										
2. Female	0.41/0.49	−0.00									
3. Education	3.57/1.25	0.32***	0.04								
4. Algorithm (1) versus human (0)	0.49/0.50	0.02	−0.02	−0.04							
5. MC algorithm	3.64/1.30	0.11	0.04	0.15**	0.65***						
6. MC human	3.24/1.31	−0.08	−0.05	−0.08	−0.66***	−0.71***					
7. Commitment-focused manipulation	0.28/0.45	0.00	−0.07	−0.02	−0.02	−0.08	0.05				
8. Control-focused manipulation	0.37/0.48	−0.03	0.01	0.00	−0.06	0.02	0.03	−0.47***			
9. Commitment-focused attributions (measured)	3.30/0.80	−0.11	0.01	−0.12***	−0.23***	−0.31***	0.34***	0.32***	−0.20***		
10. Control-focused attributions (measured)	3.40/0.59	0.07	0.00	0.20***	0.16**	0.31***	−0.24***	−0.25***	0.40***	−0.35***	
11. Organizational attractiveness	3.42/0.87	−0.08	−0.01	−0.09	−0.10	−0.11*	0.25***	0.20***	−0.26***	0.51***	−0.43***

Note: N = 342.

Abbreviation: MC, manipulation check.

*$p < .05$, **$p < .01$, ***$p < .001$.

TABLE 4 Means of organizational attractiveness across conditions in study 2.

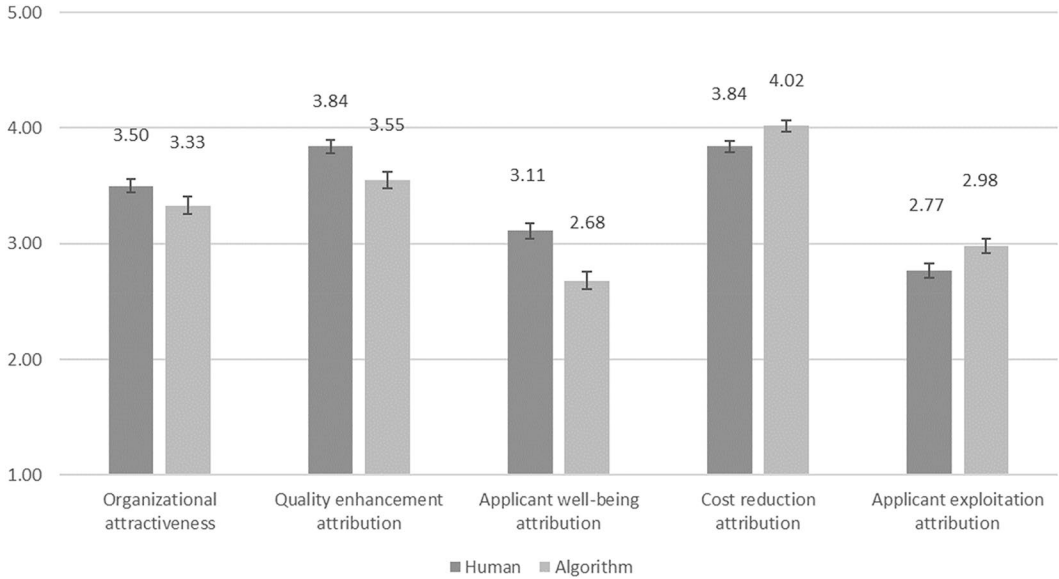|	Algorithm	Human	Commitment	Neutral	Control
Organizational attractiveness	3.33 (0.96)	3.50 (0.76)	3.70 (0.68)	3.50 (0.87)	3.13 (0.91)

Note: N = 342.

FIGURE 3 Means across conditions in Study 2. *N* = 342; error bars indicate standard errors.

7.1 | Theoretical and managerial implications

Our study makes several important contributions to the literature. We contribute to the emerging literature in (HR) management research on new technological advances. Prior work has stressed positive as well as negative effects of algorithms on (prospective) employees (Kellogg et al., 2020). Our study provides evidence for a context in which algorithms have negative consequences for organizations. Moreover, we provide answers to the unexplained, but important question about which signals the use of algorithms send. We identified applicants' attributions of organizations' intent as a relevant employee perception.

Furthermore, we contribute to the recruitment and selection literature on organizational attractiveness. Prior models of applicants' attraction have been developed in light of traditional selection procedures and identified characteristics (like gender or function) and behavior (such as competence and informativeness) of HR personnel as important predictors for applicants' perceptions and reactions (Chapman et al., 2005). Ensuing studies also added other determinants of applicants' perceptions in light of technological advances, such as the speed of Internet-based selection systems (Sinar et al., 2003). With our focus on machine-learning algorithms, we complement a new characteristic of decision-making agents to this research.

With regard to signaling theory, we extend prior reasoning in that we corroborate that companies using hiring algorithms send certain signals about their strategy and employee philosophy and, thus, are less attractive for some applicants. Many researchers apply signaling theory as theoretical explanation without studying which exact signals organizations, selection procedures, or recruiters may send. The consideration of attributions about organizations' underlying strategy and employee philosophy as reasons for the use of certain practices adds a new perspective to this stream of literature and might help us better understand prospective employees' reactions in the future. Furthermore, previous research on signaling theory has been limited mainly to positive and intentional signals that employers

send and the symbolic or instrumental inferences that employees derive from these signals (Celani & Singh, 2011; Connelly et al., 2011). In contrast, we contribute to the scarce research that suggests that organizations may send unintended signals that are detrimental for organizations (Connelly et al., 2011).

Lastly, we address two shortcomings identified in the literature on HR attributions (Hewett et al., 2018). First, scholars have argued that attribution theory is underutilized in organizational research in general (Harvey et al., 2014; Martinko et al., 2011) and in the HR domain in particular (Hewett et al., 2018; Nishii et al., 2008); thus, they have called for more research examining people's attributions about HR practices. Specifically, a lack of research on antecedents of HR attributions of intent has been highlighted (Hewett et al., 2018; Wang et al., 2020). The few existing studies mainly identified bundles of certain HR practices implemented by organizations as antecedents of HR attributions (Guest et al., 2021; Van De Voorde & Beijer, 2015). We enrich prior work by showing that it is important to look at not only which practices are implemented, but also how these practices are conducted and who will be in charge of decision-making. Second, prior research recommended also looking at attributions of specific HR practices (Hewett et al., 2018) and at applicants' attributions and reactions, in particular (Ployhart & Harold, 2004). Empirical research has been limited to the effects of attributions on current employees' attitudes and behavior (Fan et al., 2021; Van De Voorde & Beijer, 2015), but neglected the role of prospective employees. Our results provide initial evidence on HR attributions in the employee selection context and show that attributions about organizations' underlying strategy and employee philosophy are also made by applicants and affect the attractiveness organizations.

Our study also provides important managerial implications. Knowing how applicants interpret the signals that organizations unintentionally send by replacing human decision-makers with algorithms may be crucial for organizations when implementing and communicating about such procedures. Our results revealed that organizations should be cautious when evaluating the usage of algorithms in the selection process, as they could potentially harm their organizational attractiveness by sending unintentionally negative signals to applicants. Applicants' first perceptions of the selection process may not only influence whether they perceive the organization as an attractive employer, but also whether they will accept a job offer or recommend the organization to others (Chapman et al., 2005; Hausknecht et al., 2004). To avoid negative consequences, companies should either refrain from using algorithms in the selection process or proactively communicate their (reasonable) motivations for relying on algorithms and build a positive image about their underlying strategy and philosophy. Therefore, they need to instruct recruiters and hiring managers to form positive attributions (i.e., applicant well-being, quality enhancement) among applicants.

7.2 | Limitations and future research

We acknowledge that this manuscript has some limitations. First, our conclusions are not based on field data since participants did not apply for a job at a real organization. The relationship between algorithm-based decision-making and organizational attractiveness could potentially be stronger in the real world when applicants feel the consequences of the selection decision and have to decide for or against an employer. On the other hand, it is also possible that applicants' reactions are weaker in the field since our scenarios allowed us to provide participants only with limited amount of information. Thus, we encourage future research to examine the effects of algorithms in the field.

In our empirical studies, we focused on the use of algorithms in CV screening. Although we are not interested in algorithmic decision-making for ultimate employee selection as that is a less realistic setting for most companies and jobs thus far, we acknowledge that it would be valuable to replicate our findings in later stages of the selection process. It is possible that the effects differ in other processes due to differences in the levels of involvement, qualities evaluated, and expectations of applicants or commonness (Woods et al., 2020). Future research might also look at selection instruments applied at later stages (e.g., digital interviews, work samples, personality tests).

Future work might also extend our mediation model by looking at boundary conditions or inter-individual differences that affect either the relationship between algorithmic decision-making and internal attributions or the relationship between attributions and organizational attractiveness. For example, applicants' attributions about using

algorithms might be more positive for some organizations (e.g., in the high-tech industry) or applicants (e.g., depending on their prior experiences, trust, or perceptions toward the organizations). F-tests that compare the variance of organizational attractiveness across groups indicate significantly more variability in the algorithm groups (Study 1: $SD_A = 1.01$, $SD_H = 0.72$, $F(1, 257) = 24.53$, $p < .001$; Study 2: $SD_A = 0.97$, $SD_H = 0.78$, $F(1, 336) = 12.26$, $p < .001$). Thus, it seems that some individuals highly appreciate the use of algorithms whereas a larger group dislikes their use in the selection process. Prior research also suggests that outcome favorability (e.g., hired vs. not hired) affects applicants' perceptions (Ryan & Ployhart, 2000). It is possible that hired candidates rather believe that the organization pursues a quality-enhancement strategy with the use of algorithms while rejected candidates rather believe that the organization pursues a cost-saving strategy. The provision of explanations about the selection process could further influence applicants' reactions (Truxillo et al., 2009). In the context of algorithmic decision-making, recent empirical research is inconclusive about the effects of explanations on applicants' fairness perceptions (Koch-Bayram et al., 2023; Köchling & Wehner, 2022). Thus, it would be interesting to examine whether and which kind of explanations alter applicants' attributions about organizations' intents of using algorithms. Furthermore, it is reasonable that hybrid systems (i.e., HR representatives or managers making decisions with the assistance of algorithms) potentially combine the strengths of algorithms and human decision-makers and thus evoke positive reactions. Studying whether different combinations and conditions or applicants' characteristics affect the strengths of the relationships would be a promising avenue for future research.

8 | CONCLUSION

Although algorithmic decisions appear to be superior to decisions made by human experts, our results indicate that people might not perceive this to be the reason for organizations' reliance on algorithms in personnel selection. In fact, algorithms send weaker signals about an employer's intents to focus on quality and employee well-being. On the contrary, applicants attribute cost reduction and applicant exploitation as reasons why organizations rely on algorithms instead of human experts. This negatively affects organizational attractiveness. Taken together, organizations considering the use of algorithms for personnel selection decisions are well advised to take applicants' perceptions into account.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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